(12) **United States Patent**
Clark

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(54) **LEAD, WHITE**

(76) Inventor: **Edward Clark**

Edward Clark

The Schedule referred to in these Letters Patent, and making part of the same, containing a description in the words of the said Edward Clark himself of his improvements in the manufacture of "Metallic salts usually denominated White or Carbonate of Lead, Carbonate of Copper, acetate of Lead, acetate of copper, & the acetate or per acetate of iron," for which Letters Patent were granted, dated the 4th day of December 1828, which Letters Patent were cancelled on account of a defective specification & other Letters Patent granted on the 3d day of July 1832, which last Letters Patent are hereby cancelled also, on account of a defective specification —

To all to whom these Presents shall come:

Be it known that I, Edward Clark, of the town of Saugerties, State of New York, & a citizen of the United States, have discovered & invented a new and useful improvement in the manufacture of the Carbonate of Lead or White Lead, or (if the operator chooses so to apply) the process in the manufacture of the acetate of Lead, the carbonate & acetate of Copper and acetate & per acetate of iron — The process will produce all the above results by merely varying the metal required to be acted upon; & by increasing the relative proportions of the acetic acid or vinegar when the manufacture of the acetates are required: & altogether omitting the carbonic acid where the acetate or per acetate of iron is intended to be produced. But the process is principally useful in the manufacture of white Lead, or carbonate of Lead, & to that object & the manufacture of the sugar or acetate of Lead I shall confine myself in this description — This being an amended specification for a Patent to be issued in lieu of one already surrendered.

To carry into effect my improvement in the manufacture of White Lead, I construct a cylindrical vessel of brick, ten or twelve feet in height, & about the same in diameter. This vessel should be made tight & strong enough to resist some pressure from within. This is called the corroding chamber or cistern. It may also be made in the form of a box ten or fifteen feet long, eight or ten feet high & four or eight feet broad, or of any other convenient shape or size, as the price & quantity of metal or lead intended to be operated upon at a time may require. The sheets of lead cast in the usual manner & form, are hung or suspended on wooden rods or laths which are supported by cleats secured to the inside of the corroding chamber, & these sheets are placed as closely as they can conveniently be, & not touch each other. The sheets of lead may be rolled & placed on shelves perforated with holes, or upon any kind of lath or slit work, or in vessels containing vinegar, but not in contact with it, or in any other manner so as to expose their surface to the action of the acid vapours & other agents brought to act on them.

The agents I use to corrode metallic lead & make the article called carbonate of lead or white lead, are the vapour of vinegar, carbonic acid gas & oxygen gas, the last of which is contained in sufficient quantity in the atmospheric air. & these agents are made much more speedily effective by being heated & used in greater quantities or proportions than they have heretofore been applied to the same purpose, in the same space of time, & by means of all which I produce a more successful result.

To raise the vapour of vinegar so as to fill the corroding cistern & to incorporate the sheets of lead with it in the most effectual manner is my object; & this I accomplish in various ways, without being able to give a decided preference to either.

Firstly. I put the vinegar into a copper still, as shewn at C fig 1. of the annexed drawing: & then by applying heat to the furnace below, generate the vapour of vinegar, which passes from the still into the pipe F and thence along with the other agents thro' the branch pipes. H.H. &c. and [illegible] stop cocks O.S. &c. into the corroding chambers A A &c shown also in fig. 1. When this method is resorted to, the corroding agents pass from the branch pipes H H. &c into the long boxes of three or four inches depth & breadth, which are placed on the sides of the chambers & are perforated in their sides with a number of small holes for the more equal distribution of the corroding agents.

Secondly. The vinegar is put into shallow vats or troughs which also lie on the bottom of the corroding chambers, and these which are supplied with leaden pipes, which communicate with the steam generator, shown at C. fig. 4. are passed once or more times over the bottom of the troughs according to the quantity of acid vapour required to corrode the metal acted on, in the most efficient manner.

Thirdly. I put vinegar in vessels, & at a short distance above it, I place coils of sheet lead. & filling my corroding chambers with these vessels, introduce the carbonic acid gas & atmospheric air heated to such a temperature as to produce the requisite evaporation of the vinegar — or fourthly, I place a still on the outside of the corroding chamber, which is furnished with a charging, discharging & vapour pipe, each regulated by a stop cock. One of these pipes is for the admission of water into the boiler, one is for drawing it off, & the other is to conduct the steam from it & communicate the requisite degree of heat to the corroding chamber, for the evaporation of the vinegar. This pipe is conducted thro' a tube or packing box into the corroding chamber, & the still, which contains the vinegar, is supplied or emptied at pleasure, & is there, from an outward part of the corroding chamber, taken out thro' a tube or packing box. All the pipes should be furnished with stop cocks to regulate the supply of whatever may pass thro' them. Sometimes cocks or other contrivances are used to ascertain the depth or quantity of vinegar which the troughs, vats, stills, or chambers may contain. The quantity of carbonic acid gas necessary to be introduced into the corroding chambers is not great. Pure coal is used for heating) the vinegar. I take this gas by means of the induction pipe to the blowing apparatus from the furnace of the boiler or still; & where coal is not used. I take it from a small furnace built for the purpose, in which anthracite coal or wood is burned expressly for the generation of this gas. A view of this pipe is shown at B. fig 1. and a sectional view at D. fig 8. of the Annexed Drawing. The quantity of atmospheric air or oxygen gas which is contained in it, is more considerable than that of the carbonic gas (say in the proportion of two to one) and I obtain this either thro' branch pipes or apertures in the pipe B. as shown at F. fig 1. and at G fig 8. or from an aperture at or near the top of the furnace, which I leave for the purpose. The introduction of an excess of the corroding agents, into the corroding chambers is of no material consequence, because they pass off thro' the branch pipes shown at K.K. in the pipe L and thence into the other chambers successively until they become nearly or quite expended.

Connected with the requisite supply of oxygen gas or air containing oxygen gas & carbonic acid gas to the corroding chambers is a gas blowing apparatus, which receives the gases above named in the manner before described & forces them into the corroding chambers. Nevertheless both the carbonic acid gas & the vapour of vinegar may be generated within the corroding chambers. For the purpose of introducing these gases into the corroding chambers I have made use of the common Blacksmith's Bellows by dividing its blast so that one portion of the atmospheric air was made to pass thro' a lighted furnace containing ignited coal & thus furnish the carbonic acid gas, while the other supplied the requisite quantity of oxygen gas. I have also used the water bellows which is constructed by placing one inverted vessel into another vessel containing water & furnished with induction & eduction valves & pipes, which were made to force the requisite supply of the above mentioned gases into the chambers, by giving to the inverted vessels a slow but constantly alternate up & down motion and a side hand [illegible] likewise [illegible] bellows for this purpose.

Descriptions of both of these blow bellows will be found in [illegible] works [illegible] Hydraulics (Vol. [illegible]) [illegible] double acting bellows [illegible] [illegible] [illegible] diameter in the [illegible] & [illegible] making from fifteen to twenty strokes in a minute forces in a sufficient quantity of the gases to act upon about fifty or sixty tons of lead at the same time.

In fig 1 the gases & vapour of vinegar are represented as being forced in a mixed or combined state into the gas distributing box of the corroding chamber. This box is shown at fig 7

Fig 2 represents a series of cisterns, to which the gases are introduced thro' the gas distributing boxes by themselves while the heat imparted thro' the medium of steam along the pipes E.E. & Branch pipes F.F. to & thro' the trough containing vinegar which is on the floor of the corroding cistern, affords the requisite quantity of acid vapour & degree of temperature.

The vinegar bath or trough with its steam pipe & stop cocks are shown at A.B. D.D. fig 3. It should be remarked that in proportion to the increase of temperature will the process of corrosion to a certain extent be expedited — however the temperature should range somewhere between 100° & 200° of Fahrenheit & the operator should regulate it by the moist or dry appearance of the lead acted on in the chamber. The heat should be lowered & the gases increased when the lead is too moist & (vice versa) when the lead is too dry. Ordinarily, the gases when combined with the vapour of vinegar, will impart the requisite degree of heat but when introduced by themselves

I pass them thro' an apartment which is artificially heated, such as that represented at K.K. fig 6 which is heated by the smoke pipe III, passing from the furnace to & thro' it to the chimney — In making the acetate or sugar of lead [illegible] the acetate of copper, it is only necessary when the lead & copper become corroded, to shut off the gases increase the acid vapour until the carbonates which have been previously formed are converted into acetates & then evaporating the liquor which remains in the corroding chamber.

In making the per acetate or acetate of iron the vapour of vinegar and atmospheric air only are admitted & the quantity of the latter must be particularly regarded, or the oxide of iron held in solution by the acid will be precipitated. When formed this material should should be put into close casks, & so kept till required for use.

The carbonate of copper is made in precisely the same way as the carbonate of lead, but its conversion from the metallic state being much more slow & difficult than that of lead: it is found expedient to conduct this process by applying the nearly exhausted residue of the lead corroding chambers to it.

Where the corroding agents are too abundantly supplied, I place a box resembling that of the gas distributor said at B. fig 7. but containing about half the number of holes on the inside and upper part of the corroding chamber & connect it by the branch pipe K to the pipe L fig 1. which leads to & discharges itself into one or more chambers in succession which are supplied with sheet lead or copper, with a view of saving the residue of the corroding agents should any have escaped the first application. The blowing cylinder is made similar to the cylinder of a steam engine with the valves much enlarged & it may be put into operation by water, steam, or animal power.

My improvement consists in applying the combined means before described & all other substantially the same which may be arranged for forcing oxygen gas & carbonic acid gas, either pure or in a state of combination with other substances into chambers or cisterns heated or not heated which have previously been furnished with castings or sheets of lead or copper according to the metal designed to be acted on. I therefore claim as my invention the plan of forcing atmospheric air into close tight, & strong corroding chambers in connexion with carbonic acid gas & the vapour of vinegar & increasing their action by artificial heat, pressure & motion, by which the corroding agents are kept into close contact with the sheets of lead or copper, and are made to act more vigorously than in any other way heretofore known & practiced — also in combination with each other, & with the above described corroding chambers, vats, troughs, boxes, boilers, & apparatus for conducting & forcing the agents for corroding the lead or copper, into the corroding chambers in the manner above described or in any other manner substantially the same. The accompanying Drawing will further illustrate my specification.

Witnesses
Jas A. Bicknell Jun
Geo. Curtis.

Edward [illegible]

2566

Description of the annexed Drawings — fig 1. represents a series of corroding cisterns with a blowing apparatus, for supplying them with atmospheric air, carbonic acid gas, & the vapour of vinegar. A A &c represents the corroding cisterns or chambers. B the blowing cylinder or apparatus. C the lead or copper boiler containing vinegar. D the furnace for heating the vinegar & also for supplying carbonic acid gas. E the induction pipe for supplying the blowing apparatus with carbonic acid gas from the furnace. F an aperture to admit a supply of atmospheric air into the blowing cylinder thro' the pipe E. G the eduction pipe for conveying the carbonic acid gas, the atmospheric air, & the vapour of vinegar into the corroding cisterns or chambers. H. H. &c the lateral branch pipes for supplying the distributing boxes seen at B.B. fig II, with the corroding materials from the main pipe G.

I. I. &c the stop cocks to regulate the admission or exclusion of the corroding materials at the pleasure of the attendant. K.K. &c the eduction branch pipes, with their cocks. L the main eduction pipe.

Fig. II, represents an interior view of the corroding cisterns or chambers, partially supplied with their castings of metallic lead, disposed for corrosion in various ways A.A. represents two chambers laid open B.B. the boxes perforated with small holes for distributing the corroding materials in the chambers C.D. & E. sheets of lead suspended or coiled as exposed for corrosion.

Fig. III represents a sectional view of the blowing apparatus, furnace & still, as shown entire in fig I.

Fig. IV. representing a series of corroding cisterns with the gas distributing apparatus as described in Fig. I. with an additional apparatus for heating the gases (also for generating the said steam within the chambers. A. A. &c. A view of the chambers or corroding cisterns. B the blowing cylinder. C the steam boiler. D the furnace. E.E.E. main steam pipe. F F &c. branch steam pipes leading from E through the troughs G, in the chambers. G.G. &c the ends of the troughs as shown projecting from the corroding cisterns in A. Fig. VII for receiving the vinegar which is to be heated by the steam pipes F thro' the apertures there shown at G.

H.H. &c the pipes for conveying the gases thro' the heated chambers of the furnace as shown at P.P. fig VIII from the blowing cylinder, thro' the branch pipes I. &c to the corroding chambers. I.I. &c the lateral branches of the main gas pipe for conveying the gas to the distributing boxes as seen at B.B. fig I. & furnished with stop cocks the main as thrown in the steam pipes. K the smoke pipe. Fig. V. Two of the chambers open to view. A.A. the two chambers or Corroding Cisterns B.B. troughs for containing vinegar C.C. boxes for distributing the gases. D.D. &c rods or laths for supporting sheets of lead E.E. &c sheets of lead suspended over the rods.

Fig. VI. A vertical section of one of the chambers with its door removed. A.A. &c the rods or laths for supporting the sheets of lead. B the trough for containing the vinegar C the gas distributing box

Fig. VII. A ground plan of one of the cisterns with its trough, box & pipes. A is the trough for containing vinegar. B. the steam pipe running thro' the vinegar trough A, C the pipe for conveying off the waste steam or condensed vapour D.D. stop cocks for regulating the supply of the corroding material. E. the gas distributing box F the branch of the main pipe connected with the distributing box.

Fig. VIII. A sectional view of the blowing cylinder, & chamber for heating the gases. A represents the piston **head** & rod of the cylinder. B.B. the induction valves. C.C. the eduction valves. D the induction pipe for supplying carbonic acid gas from the furnace & air from the aperture shewn at E. E the aperture for admitting atmospheric air. F the eduction pipe which conveys the gas from the blowing cylinder to the heated chamber. G.G. boiler for converting water into steam & heating the vinegar in the trough. H the furnace I.I.&c the smoke pipe K.K. the chamber for heating the gases on their passage thro' the pipe L to be distributed thro' the cisterns L pipe leading from the heated chamber for the conveyance of the heated gases as above described. Exd. H. Apl 17

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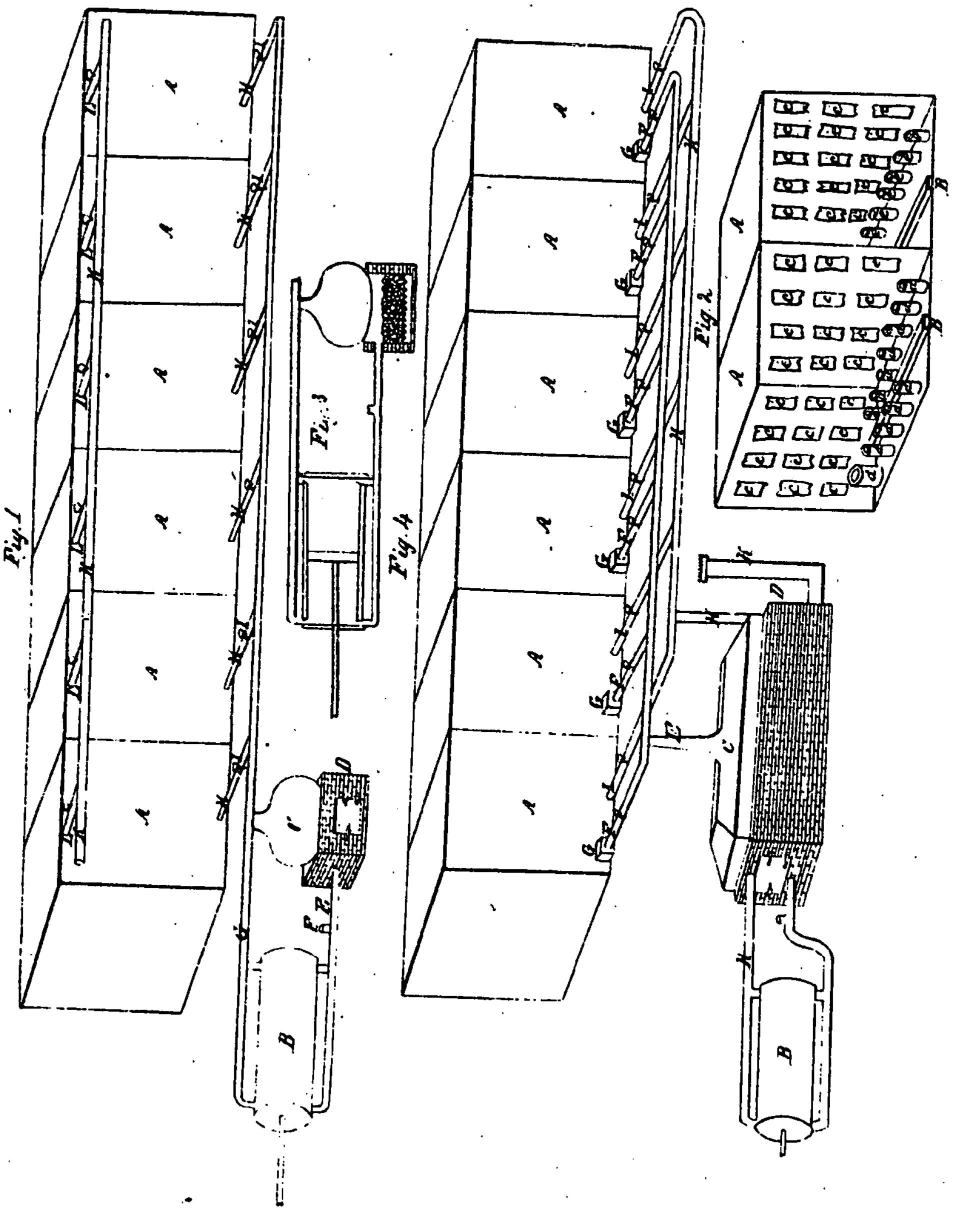
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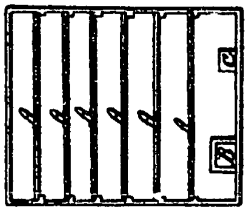
Fig. 6



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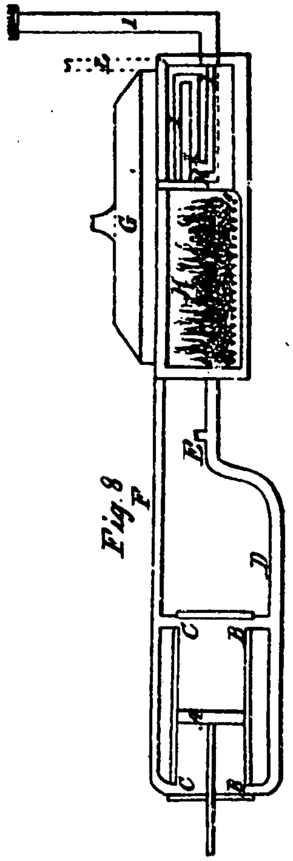
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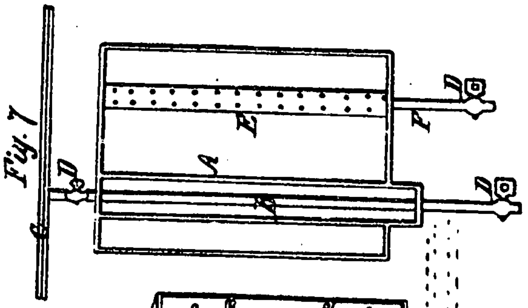

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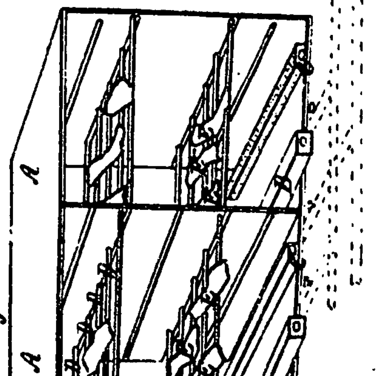

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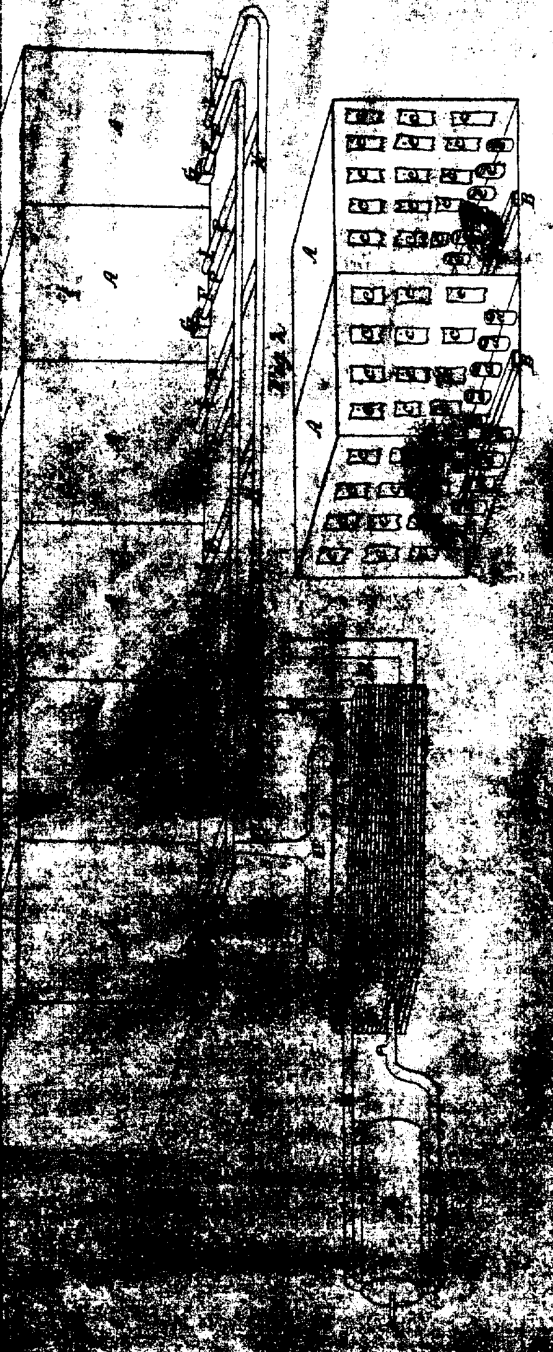
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Fig. 2.

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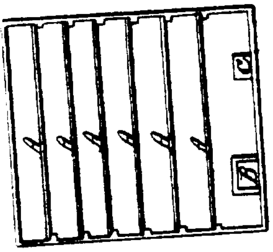
Fig 6



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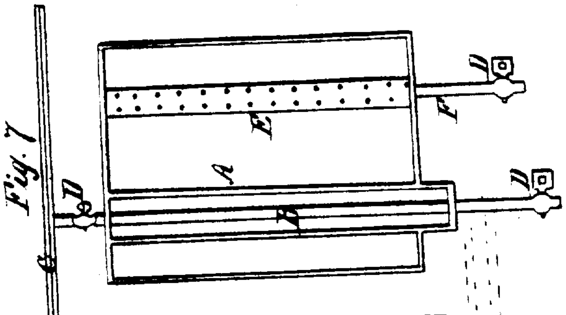

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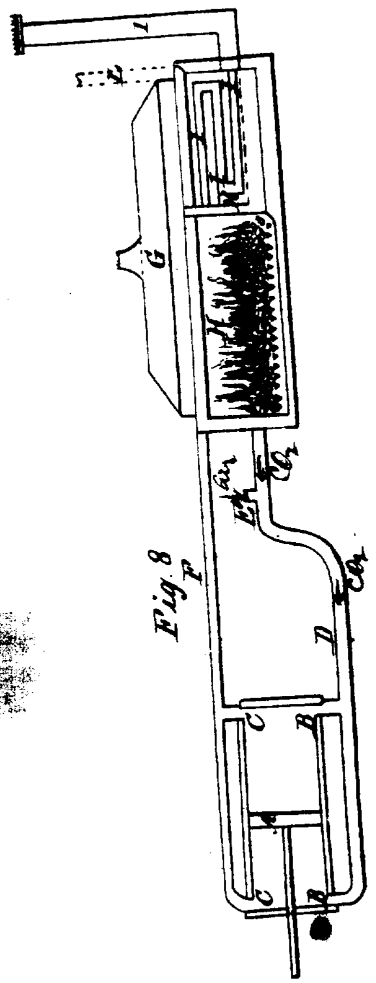
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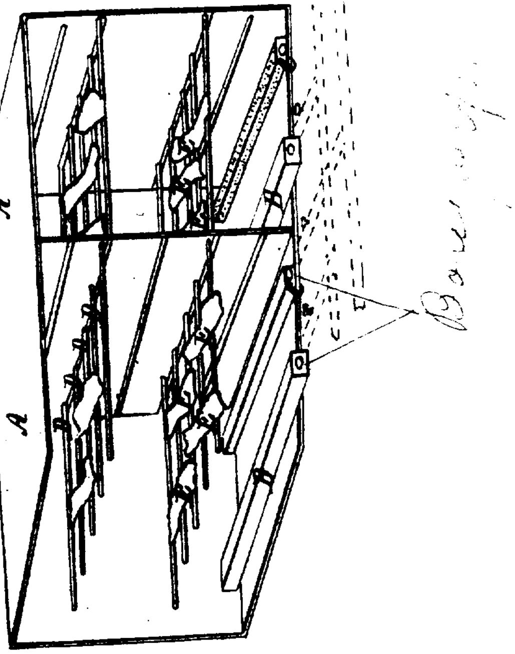

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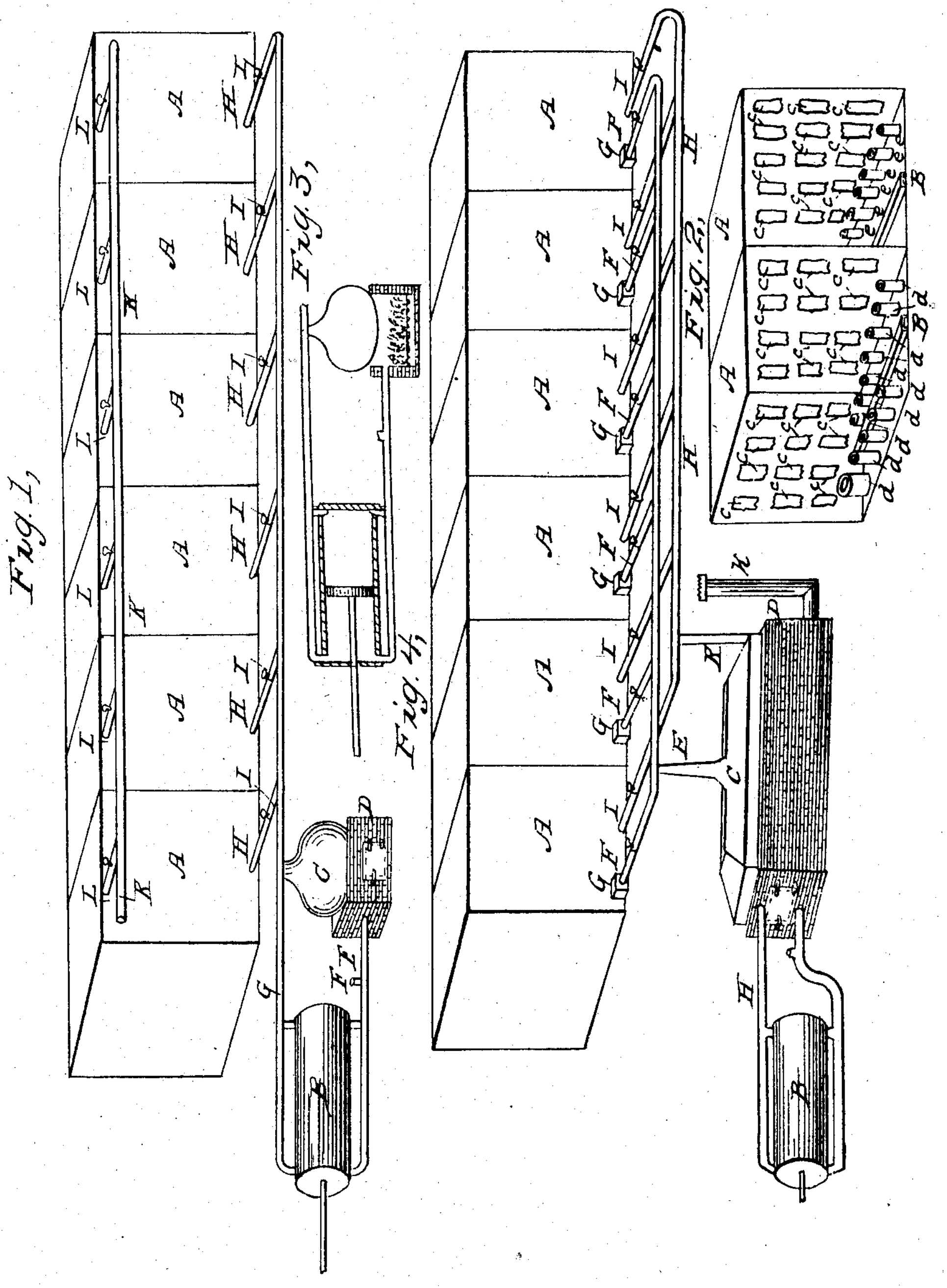

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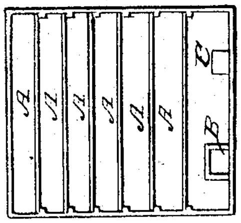
Fig. 6



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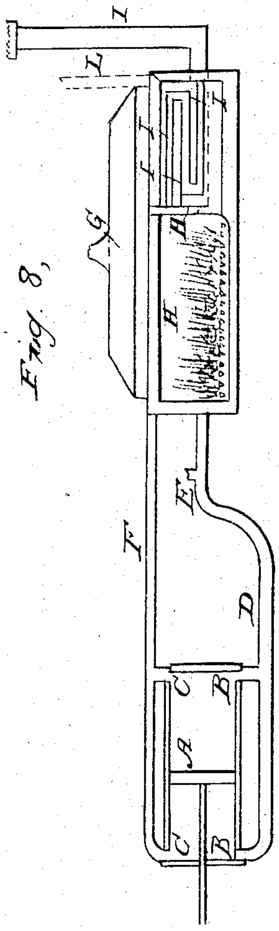
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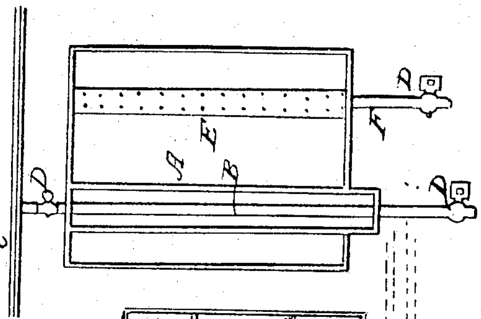

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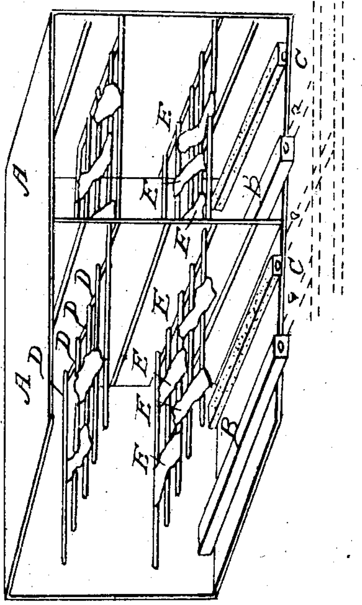
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